

# StemRad® Personal Protection

Revised August 2014

## StemRad® 360 Gamma™ User Manual



**\*\*\*This information packet may not be removed except by the end user\*\*\***



**STEMRAD**  
Radiation Protection for the  
Day Prevention Fails™

## Table of Contents

<b>Product Features</b>	<b>3</b>
<b>Safety Considerations</b>	<b>4</b>
<b>Wearer Qualifications</b>	<b>4</b>
<b>Required and Additional Equipment</b>	<b>4</b>
<b>Garment Maintenance Schedule</b>	<b>6</b>
<b>Garment Inspection</b>	<b>6</b>
<b>Internal Inspection</b>	<b>7</b>
<b>Repairing Garment</b>	<b>7</b>
<b>Dosimeter Card Replacement</b>	<b>7</b>
<b>Duration of Recommended Use</b>	<b>7</b>
<b>Storage Conditions</b>	<b>8</b>
<b>Transportation</b>	<b>8</b>
<b>Suggested Undergarments</b>	<b>8</b>
<b>Sizing Considerations</b>	<b>8</b>
<b>Donning the Garment</b>	<b>8</b>
<b>Doffing the Garment</b>	<b>10</b>
<b>Decontamination and Cleaning</b>	<b>10</b>
<b>Garment Retirement Considerations</b>	<b>11</b>
<b>Disposal</b>	<b>11</b>
<b>Usage Guidance</b>	<b>11</b>
<b>Warnings</b>	<b>11</b>
<b>Your Responsibility as a User</b>	<b>12</b>
<b>Disclaimers</b>	<b>13</b>
<b>StemRad 360 Gamma Sizing Chart</b>	<b>14</b>
<b>Inner Label Icon Legend</b>	<b>14</b>
<b>StemRad 360 Gamma Performance</b>	<b>15</b>
<b>Garment Inspection &amp; Test Log</b>	<b>17</b>
<b>Optional Accessories</b>	<b>18</b>

## Back



## Front



## Safety Considerations

IMMEDIATELY STOP WORK IF PERSONAL PROTECTIVE EQUIPMENT (PPE) FAILS. If any item of the PPE fails during use, immediately cease work activity, safely remove the PPE, determine the cause of the PPE failure and re-evaluate the selection and use of the PPE for that task. Be sure to read, understand and follow the information in this manual and all applicable federal, state and local occupation safety and health statutes. Serious injury or death may occur from improper use of PPE. Proper use must be consistent with NFPA 1500, Standard on Fire Department Occupational Safety and Health Program and NFPA 2113, Standard on Selection, Care, Use and Maintenance of Flame-Resistant Garments for Protection of Industrial Personnel against Flash Fire. Additionally, use these garments in accordance with applicable personal protective equipment regulations, which in the United States is 29 CFR 1910.132. For users of these garments outside the United States, consult national or other applicable personal protective equipment laws and regulations.

While wearing any StemRad™ garment, including the 360 Gamma, do not knowingly enter an environment in which the radiation levels are beyond turn-back exposure rates and dose limits as defined in local guidelines. Immediately retreat if you determine that you are exposed to radiation levels which are beyond turn-back exposure rates and dose limits as defined in local guidelines while wearing any StemRad™ garment, including the 360 Gamma.

StemRad™ garments will not protect you in all situations and environments or protect

you from all radioactive materials. You must be a trained and qualified safety professional to select radiation protective clothing. It is your responsibility as a user of this garment to determine the level of exposure and the proper PPE needed. Most performance properties cannot be tested by the users in the field.

If any of the following symptoms develop while you are wearing a StemRad™ garment, immediately leave the contaminated area, undergo field decontamination, and remove (doff) the garment:

<b>Fever</b>
<b>Difficulty breathing</b>
<b>Nausea</b>
<b>Excessive Tiredness</b>
<b>Dizziness</b>
<b>Numbness</b>
<b>Any unusual odor or taste</b>
<b>Eye or skin irritation</b>
<b>Narrowing or dimming of vision</b>
<b>Claustrophobia</b>
<b>Loss of balance or orientation</b>

## Wearer Qualifications

Do not wear a StemRad™ garment unless you are properly trained in its usage. You must be in good physical condition to wear these garments. Consult a physician before donning one of these garments to ensure you are capable of wearing these garments under the expected work conditions and environment.

## Required and Additional Equipment

To help protect you while wearing StemRad garments and to ensure that the garment performs as intended, wear, at a minimum, several additional items of PPE. Environmental testing and hazard

assessment by a safety professional can help identify hazards and risk levels and direct choices of permissible PPE.

At a minimum, wear the following additional PPE with a StemRad™ garment such as the 360 Gamma (Note: other PPE equipment should be worn over the 360 Gamma):

**RESPIRATORS:** Protection of internal organs from inhalation of radioactive particulates can be provided by wearing an appropriate particulate respirator. Recommended respiratory PPE for a radiation emergency includes a full-face piece air purifying respirator with a P-100 or High Efficiency Particulate Air (HEPA) filter.

A representative **Air-purifying respirator (APR):**



In the case of firefighters, the self-contained breathing apparatus (SCBA) will provide the highest level of protection.

It is your responsibility to verify that the selected respirator will provide adequate protection.

**DOSIMETERS:** PPE should include a personal radiation dosimeter whenever there is concern about exposure to penetrating ionizing radiation.

- Direct-reading personal radiation dosimeters may be used to monitor radiation dose and can help workers stay within recommended Dose Limits for Emergency Workers.
- Direct-reading dosimeters should be worn so that a worker can easily see the read-out and/or hear warning alarms.

**DERMAL PROTECTION:** PPE to prevent skin contamination of particulates is very effective against particulate-borne radiation hazards (i.e., alpha and beta particles). In a radiation-only event, typical fire fighter "turn-out" gear, is generally adequate for this purpose, yet the use of Level C (U.S. Guidelines) Dermal protection is advised.

**Level C dermal protection:**

Overalls	Inner and outer chemical-resistant gloves.
Two-piece chemical splash suit	Face shield
Disposable chemical-resistant overalls	Chemical-resistant inner suit (e.g, Tyvek)
Chemical-resistant boots, with steel toe and shank OR Disposable, chemical-resistant outer boot covers.	Hard Hat

The use of turn-out gear or any disposable protective clothing suitable for particulate exposure should be followed by appropriate decontamination of personnel and equipment.

It is your responsibility to verify that the selected dermal PPE will provide adequate protection.

**OTHER PERSONAL PROTECTIVE EQUIPMENT:** You may need other PPE based on the hazard assessment and PPE selection made by a trained and experienced safety professional. It is your responsibility to determine if you need separate head protection. For example, you may require hearing protection due to high levels of external noise or high noise levels generated by supplied air systems. You may require additional protective equipment to deal with hazards created by, but not limited to, the following conditions:

- Flammable or Explosive Environment
- Chemical Hazards

- Biological Hazards
- Decontamination
- Extreme Heat (Heat Stress)
- Extreme Cold (Hypothermia)
- Asphyxiating Atmosphere
- Physical Hazards (Sharps, Puncture, Rough Surfaces, Falling Debris)
- Slipping or falling
- Visibility - of wearer & by wearer
- Communications

### Garment Maintenance Schedule

Work/Interval	Upon Receipt	Prior to Use	After each Use	Annually	Every five Years
Inspect by Wearer	X	X			
Cleaning			X		
Garment Inspection	X		X		X*
Internal Inspection					X*
Dosimeter Replacement			X**	X***	

\*Inspection by StemRad authorized employee or authorized service provider- needed to maintain any type of warranty.

\*\*Only in radioactive fields \*\*\*High temperatures may necessitate more frequent replacement

### Garment Inspection

You must inspect the physical integrity of the garment component of the 360 Gamma at the following times:

1. Immediately upon receipt from supplier

2. After a garment is worn
3. Every 5 years by a StemRad specialist

Your inspection determines if the performance of the garment has been compromised. Perform the first inspection as soon as you receive the product. This

ensures that no damage occurred during shipping. Inspect the garment after each use, especially if the product is subjected to physical stress.

**Do not use contaminated, damaged or altered StemRad products.**

Follow these steps with inspecting the garment:

1. Lay the 360 Gamma on a clean, smooth surface.
2. Examine the outside of the garment for holes, cuts, or tears.
3. Examine the garment material and seams for signs of damage. Fabrics and seams sometimes have visual blemishes that do not affect performance. A breach or rupture of a seam or the fabric itself is cause for rejection.
4. Examine the shoulder straps for integrity and make sure they are firmly connected to the belt component of the product by pulling on them.
5. Examine the garment main buckle for easy fastening and release.
6. Examine all secondary buckles, sliders and straps for smooth operation to make sure they are not obstructed
8. Examine dosimeter card to ensure that the color indicator is blank.

**Repairing Garment**

Do not use a damaged, altered or contaminated garment. If an uncontaminated or unaltered garment fails a visual inspection, contact your safety equipment distributor or StemRad at +1-650-388-9112 or tech@stemrad.com to

determine if the garment can be returned for inspection or repair. Note: Charges may be incurred. Contaminated garments will not be accepted for repair. Do not send a garment that is discolored, smells or has an abnormal Geiger counter reading. With each returned garment, you must provide the garment testing log and a declaration that the garment has not been exposed to radioactive materials, chemicals or to biological pathogens. **Do not attempt to return a product without authorization from your safety equipment distributor or from StemRad.**

**Internal Inspection**

The radiation attenuating component of the 360 Gamma (i.e. 'core') is to be inspected only by a StemRad specialist. Such an inspection is to be done at your facility once every 5 years.

**Dosimeter Card Replacement**

Contact StemRad tech support at +1-650-388-9112 or tech@stemrad.com to replace the dosimeter card. Replacement should take place at least once a year, dependent on storage conditions- cooler storage conditions are preferred. Regardless, if coloration of the dose indicator is present, the card should be replaced as soon as possible.

**Duration of Recommended Use**

The StemRad 360 Gamma may be used as long as it passes a full visual inspection. In addition to the visual inspection, the 360 Gamma must pass an inspection of its inner core (the radiation attenuating component) every 5 years. This inspection is to be done only by a StemRad specialist.

The dosimeter card in each unit is to be replaced by the end user at least once a year (see 'Dosimeter Card Replacement' above).

Retire and label "For Training Use Only" or discard after mutilation, uncontaminated units that do not pass a visual inspection.

## Storage Conditions

Long-term Storage of the 360 Gamma should be in its original case in a cool, dark, dry location free of dirt and insects. Short-term storage, such as in a deployable vehicle, should be such that there is minimization of exposure to sunlight, ozone, high temperatures (>120° F) and vehicle exhaust fumes.

Avoid compression under heavy weights and sharp edges or projections. Never step on the 360 Gamma. Never place or store heavy objects on top of the units.

## Transportation

If the 360 Gamma needs to be transported over distances, it should be placed in a crush-proof container to avoid physical damage.

## Suggested Undergarments

Thick, bulky clothing worn underneath the 360 Gamma will affect the fit of the garment and potentially compromise the protection provided.

It is strongly advised to wear the 360 Gamma as close as possible to the skin of the user. Thin, non-melting materials should be used in undergarments. These could include NOMEX or other non-melting fabrics such as wool, cotton, silk and rayon.

## Sizing Considerations

Verify the size of your StemRad garment before actual use. Start with the sizing chart found at the end of this document. Verify the size selection with a garment of the recommended size and style you intend to use.

Don the garment and perform a series of exercises to simulate your movements under actual work conditions.

Such exercises may include:

- pick up a box, carry it and set the box down in a separate location.
- pick up a wrench from the ground.
- open the garment closure.
- climb up and down stairs and ladder.
- wear and remove the SCBA if applicable.

A garment one size larger or smaller than recommended in the table may be required. However, a garment that is too large is as unsatisfactory as a garment that is too small.

## Donning the Garment

Before donning the 360 Gamma:

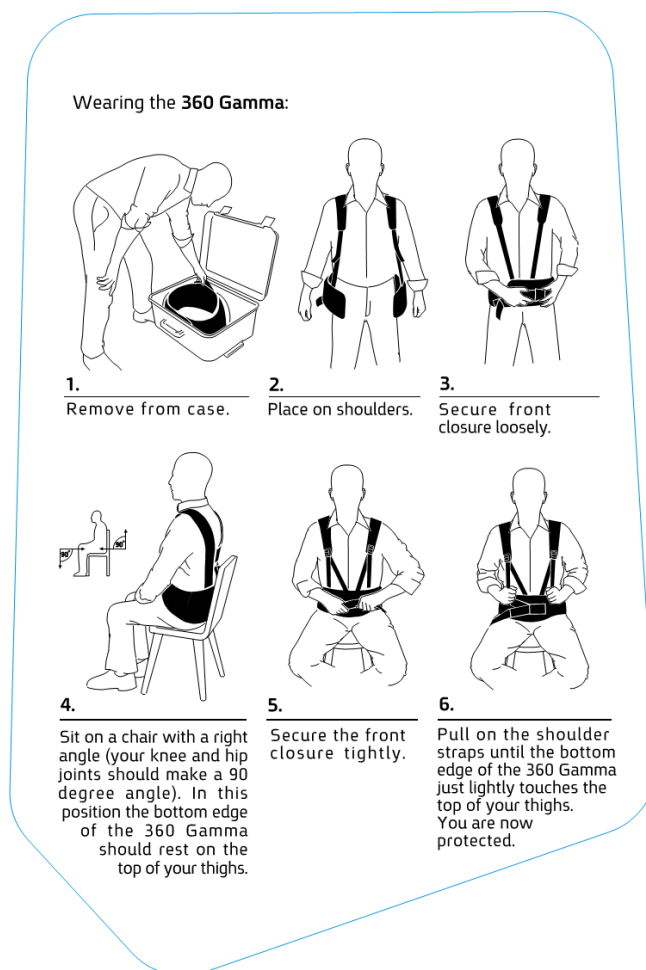
- conduct a visual inspection of the garment as detailed under 'Garment Inspection', above.
- read garment size label to assure proper fit.
- remove as many layers of your clothing as possible to minimize the space between the garment and your skin.



Donning your 360 Gamma is simple, yet it is important to follow the following steps in order to ensure optimal protection:

1. Remove the 360 Gamma from its case by grabbing the rear handle (as illustrated in Step 1, below).
2. Place the shoulder straps on your shoulders, allowing the belt portion to lie freely around your waist (as illustrated in Step 2, below).
3. Secure the front closure mechanism loosely (as illustrated in Step 3, below).
4. Sit on a chair with a straight back (your hip joint should make a 90 degree angle). In this position the bottom edge of the 360 Gamma should rest on top of your thighs. If it does not, loosen shoulder straps until it does (as illustrated in Step 4, below).
5. Secure the front closure mechanism tightly (as illustrated in Step 5, below). Secure sternum strap at this opportunity as well.
6. Tighten the shoulder straps until the bottom edge of the 360 Gamma just lightly touches the top of your thighs (as illustrated in Step 6, below).
7. Other PPE should be worn over the 360 Gamma.

**Step-by-step illustration of product donning:**



## Doffing the Garment

If your garment has been contaminated or is suspected of being contaminated, you must first undergo field decontamination.

In case of contamination, **continue to use your respirator** until the garment has been doffed and removed.

In case of no contamination, or after field decontamination, remove the garment by following these easy steps:

1. Release buckle
2. Loosen belt strap
3. Release sternum strap
4. Lift one shoulder strap while concomitantly grabbing the rear handle.
5. Lift second shoulder strap and guide the 360 Gamma to its case by the rear handle.

## Decontamination and Cleaning

StemRad garments are designed for multiple-use applications – they can be worn until damaged, altered or irreversibly contaminated.

If the garment is contaminated during use, it must be decontaminated.

It is the responsibility of the safety professional having responsibility over usage of the garment to determine whether the suit has been irreversibly contaminated or may be safely decontaminated and re-used.

## Field Decontamination

If you know or suspect that a garment has been contaminated with hazardous radioactive or chemical materials:

Use water and mild dishwashing liquid to field decontaminate the garments prior to doffing.

Do not use oxidative, corrosive or reactive decontamination solutions to remove known or suspected chemical or radioactive contaminants.

You must discard the garment if after field decontamination it still shows abnormal Geiger counter readings.

### The steps of field decontamination are:

1. Leave the hot zone with adequate air supply (in case of a SCBA) for field decontamination and removal of the garment. Continue to wear the respirator until you completely doff the garment and it is removed from your presence.
2. Thoroughly clean the garment using household dishwashing liquid and soft brushes, followed by a thorough rinsing in water.
3. Remove the excess rinse water from the garment before doffing. Absorb and dry the rinse water on and near the 360 Gamma.

### Inspection before re-use:

Field decontamination does not guarantee that a garment is safe to re-use. Garments previously contaminated with radioactive or otherwise hazardous materials must not be re-used until removal of contaminants is verified (e.g. by a Geiger counter reading).

Thoroughly inspect a decontaminated garment before re-use following the instructions provided in manual (see, 'Garment Inspection', above). Do not re-use the garment if it fails the inspection or shows sign of alteration, damage or contamination.

## Garment Retirement Considerations

Retire StemRad garments from service if any of the following criteria are met:

- Garment fails to pass visual inspection.
- Garment has had prolonged exposure to intense heat and/or ultraviolet light.
- Garment has been irreversibly contaminated
- Garment has been decontaminated with an oxidative, corrosive or reactive decontamination agent.
- Retired garments that are not contaminated may be labeled and used “For Training Only”. Label with a permanent marker.

## Disposal

Please contact StemRad technical support for consultation regarding disposal at +650-388-9112 or tech@stemrad.com .

## Usage Guidance

### PPE Failure

IMMEDIATELY STOP WORK IF PERSONAL PROTECTIVE EQUIPMENT (PPE) FAILS. If any item of the personal protective equipment fails during use, immediately cease work activity, safely remove the PPE, determine the cause of the PPE failure and re-evaluate the selection and use of the PPE for that task.

**Required Equipment:** The StemRad 360 Gamma should be worn with additional PPE as described in the “Required and Additional Equipment” section of this guide.

**Temperature Range:** StemRad garments can be used in an ambient environment from -13° F (-25° C) to 190° F (88° C). Do not store StemRad garments at temperatures exceeding 120° F (48° C).

### **\*\*Warnings\*\***

**Follow these warnings and limitations at all times:**

- The 360 Gamma provides only partial body protection from externally penetrating ionizing radiation. **Most of your body is unprotected.**
- The 360 Gamma is configured to protect bone marrow. The 360 Gamma **DOES NOT** provide whole body protection.
- The 360 Gamma provides meaningful partial body protection only against common radioisotopes such as Cs-137, Te-132, I-132, I-131, Ba-140, Zr-95, Nb-95. The 360 Gamma’s efficacy decreases as photon energies rise and provides insignificant protection from radioisotopes with photon energies above 1.2 MeV. **Always know the range of radioisotope energies you are facing and the relative contribution of each to the total dose.**
- The 360 Gamma may be beneficial in reducing the incidence of Acute Radiation Syndrome (ARS), but provides **little or no protection from the long-term effects of ionizing radiation (such as cancer).**
- The 360 Gamma provides **no protection from chemical or biologic hazards.**
- The 360 Gamma is made of fire-resistant materials yet **does not protect you from fire.**

-The 360 Gamma offers little or no thermal insulation to protect the wearer's skin from prolonged exposure to hot or cold. The temperature range for the fabric and seams is well beyond the temperatures that the human skin can withstand without injury.

-If the danger of exposure to biological aerosols or chemical warfare chemicals exists, consider use of a protective ensemble certified to NFPA 1991 or to NFPA 1994.

-Minimize or avoid direct exposure of personnel to ionizing radiation. **Always follow turn-back exposure rates and dose limits as defined in local guidelines.** Do not assume that these guidelines do not apply to you because you are wearing StemRad PPE. For more information, see "Safety Considerations" above.

-StemRad garments are not suitable in all situations and environments. All decisions regarding the selection and use of Radiation protective clothing must be done by trained and qualified safety professionals.

-It is the user's responsibility to determine the level of exposure and the proper personal protective equipment needed.

- You must be physically fit to wear a StemRad garment. You should be examined and approved by a physician as physically fit to wear the 360 Gamma.

### Your Responsibility as a User

You must be a trained and qualified safety professional to select radiation protective garments.

It is your responsibility as a user of this garment to determine the level of exposure

and the proper personal protective equipment needed.

It is your responsibility as a user to select garments which are appropriate for each intended use and which meet all specified government and industry standards.

StemRad garments are intended to help reduce the potential for injury, but no protective apparel alone, can eliminate all risk of injury. Protective apparel must be used in conjunction with general safety practices.

StemRad garments are designed for limited use. It is the wearer's responsibility to inspect garments before use and periodically to ensure that all external components, including fabric, zippers, seams, and interfaces are in good working condition.

Failure to fully inspect garments may result in serious injury to the wearer. Never wear garments that have not been fully inspected.

Immediately remove from service any garment which does not pass inspection. Never wear a garment that is contaminated, altered or damaged.

If the StemRad garment is altered, abraded, cut, torn, punctured or otherwise and in any way compromised, do not use.

The 360 Gamma has finite resistance to abrasion, cut, tear and puncture.

If the StemRad garment is damaged during use and no longer adheres to the user's body, retreat immediately to a safe environment, and thoroughly decontaminate the garment.

It is the responsibility of the garment wearer, and the wearer's supervisor and employer to examine the condition of the garment before and during use to be sure that the garment is suitable for use in that environment by that employee.

## **Disclaimers**

StemRad makes no guarantee of results and assumes no obligation or liability in connection with the use of StemRad garments and accessories. It is user's responsibility to determine the level of hazards and the proper personal protective equipment needed.

IN NO EVENT SHALL STEMRAD BE LIABLE FOR ANY SPECIAL, INCIDENTAL, INDIRECT, PUNITIVE OR CONSEQUENTIAL DAMAGES, WHETHER ARISING FROM CONTRACT, TORT, WARRANTY, REPRESENTATION, INSTRUCTION, DESIGN OR MANUFACTURING DEFECTS, OR ANY OTHER CAUSE OR THEORY.

The product information provided in this manual corresponds to our current knowledge on the subject. It is offered solely to provide possible suggestions for your own experimentations. It is not intended, however, to substitute for any testing you may need to conduct to determine for yourself the suitability of our products for your particular purposes. It is the user's responsibility to determine the level of risk and the proper protective equipment needed for the user's particular purposes. This information may be subject to revision as new knowledge and experience becomes available. Since we cannot anticipate all variations in actual end-use, STEMRAD assumes no liability in

connection with any use of the StemRad 360 Gamma garment and accessories.

STEMRAD MAKES NO WARRANTIES AND ASSUMES NO LIABILITY IN CONNECTION WITH ANY USE OF THE INFORMATION IN THIS PUBLICATION.

Nothing in this publication is to be considered as a license to operate under or a recommendation to infringe any trademark or patent right.

StemRad™, 360 Gamma™ and Radiation Protection for the Day Prevention Fails™ are trademarks or registered trademarks of StemRad LTD.

Please contact StemRad LTD. at the address below with regard to any questions concerning the use of the 360 Gamma.

StemRad LTD., 4 Berkovich Street, Tel Aviv 64238, Israel . [www.stemrad.com](http://www.stemrad.com).

## StemRad 360 Gamma Sizing Chart

**Waist**





→

	waist	80-95 cm 31"-37"	95-110 cm 37"-43"	110-125 cm 43"-49"
height				
190-200 cm 6'3"-6'7"		<i>S Tall</i>	<i>M Tall</i>	<i>L Tall</i>
180-190 cm 5'11"-6'3"		<i>S Tall</i>	<i>M Tall</i>	<i>L Tall</i>
170-180 cm 5'7"-5'11"		<i>S Reg.</i>	<i>M Reg.</i>	<i>L Reg.</i>
160-170 cm 5'3"-5'7"		<i>S Reg.</i>	<i>M Reg.</i>	<i>L Reg.</i>
150-160 cm 4'11"-5'3"		<i>S Reg.</i>	<i>M Reg.</i>	<i>L Reg.</i>

**Height**

↑

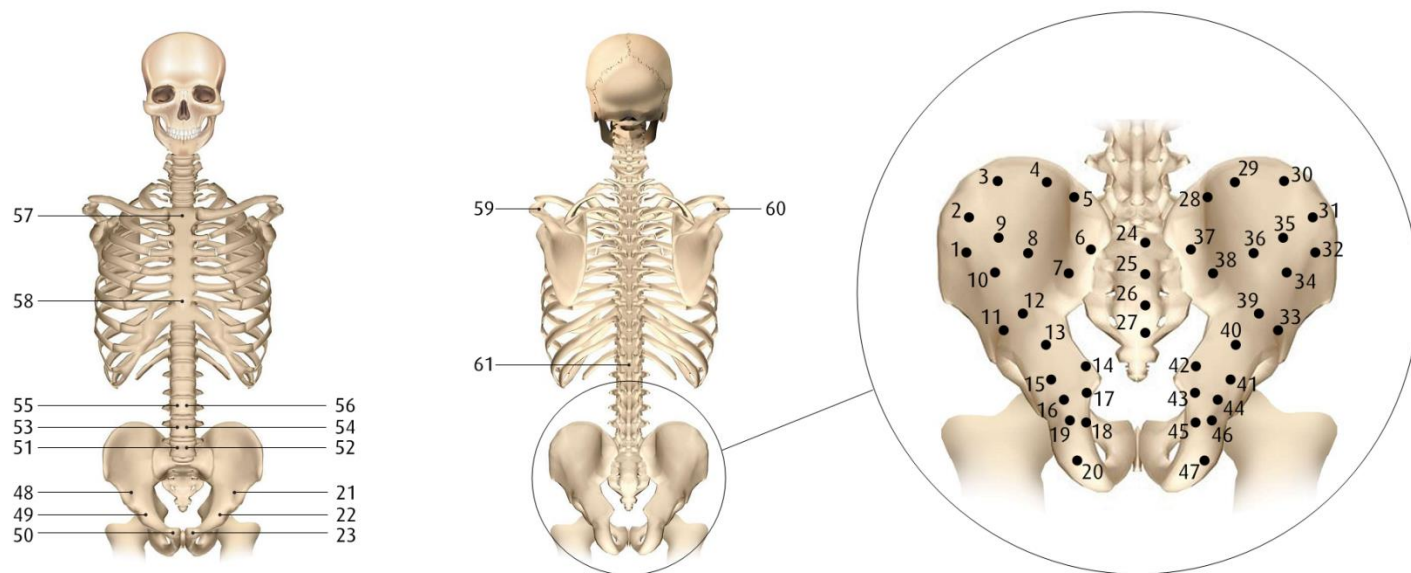
## Inner Label Icon Legend

Icon	Description
	consult User Manual
	protection against ionizing radiation
	can be used with firefighters' clothing and SCBA's
	complies with the PPE Directive, 89/686/EEC

## StemRad 360 Gamma Performance

Cloud Source Attenuation:

TLD No.	Unprotected	StemRad Protected	TLD No.	Unprotected	StemRad Protected	TLD No.	Unprotected	StemRad Protected	TLD No.	Unprotected	StemRad Protected
1	0.668	0.524	16	0.592	0.328	31	0.657	0.378	46	0.589	0.404
2	0.656	0.438	17	0.608	0.372	32	0.658	0.454	47	0.612	0.408
3	0.702	0.41	18	0.595	0.349	33	0.653	0.481	48	0.581	0.36
4	0.662	0.41	19	0.622	0.36	34	0.707	0.49	49	0.557	0.424
5	0.625	0.34	20	0.69	0.378	35	0.627	0.398	50	0.524	0.399
6	0.789	0.398	21	0.627	0.388	36	0.569	0.346	51	0.52	0.408
7	0.624	0.357	22	0.607	0.382	37	0.64	0.358	52	0.58	0.303
8	0.654	0.367	23	0.517	0.317	38	0.592	0.271	53	0.56	0.327
9	0.606	0.387	24	0.649	0.308	39	0.598	0.372	54	0.536	0.326
10	0.591	0.414	25	0.678	0.362	40	0.637	0.407	55	0.579	0.382
11	0.655	0.369	26	0.722	0.4	41	0.572	0.388	56	0.584	0.408
12	0.646	0.382	27	0.719	0.403	42	0.616	0.406	57	0.422	0.484
13	0.684	0.352	28	0.729	0.375	43	0.634	0.313	58	0.506	0.534
14	0.675	0.338	29	0.596	0.377	44	0.623	0.345	59	0.59	0.546
15	0.625	0.374	30	0.584	0.382	45	0.629	0.402	60	0.587	0.536
									61	0.494	0.454



**Relative pelvic marrow doses upon exposure to a cloud source of Cs-137 in the absence and presence of the StemRad 360 Gamma.** The dose recorded in each numbered TLD dosimeter is expressed as a fraction of the ambient dose (in-air). In sketch below front and rear views of a human skeleton with exact placement of the TLD dosimeters is shown.

**Projected Survival Rates:**

Projected survival rates\*, comparing unprotected exposure with exposure using the StemRad 360 are as follows:

Radiation Dose (rad)	% Survival	
	Unprotected	360 Gamma Protected
80	100%	100%
160	96%	100%
280	80%	100%
450	35%	99%
800	0%	95%











This projection stands true only if no other tissue besides bone marrow is irreversibly damaged up to 800 rads. This projection is based on the assumption that the product used is of proper size and used as described in this manual. This projection is based on the assumption that the average photon energy of the present radionuclides does not exceed that of Cs-137 (0.66 MEV). StemRad does NOT guarantee any outcome whatsoever and strongly advocates following local safety guidelines regardless of product use.

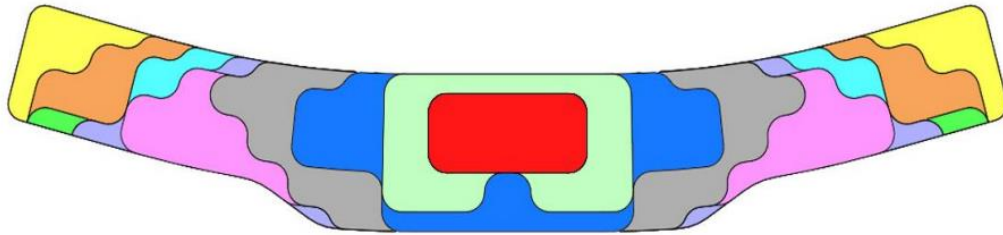
\*Justification for this projection is available on request



### Lead Equivalence and Linear Radiation Attenuation:

The figure below shows the varying thickness of protective material in the 360 Gamma in terms of lead equivalence, together with the reduction of radiation intensity provided by each thickness level in terms of radiation from a linear Cs-137 source.

										
<b>Lead Equivalence</b>	<b>3mm</b>	<b>4mm</b>	<b>5mm</b>	<b>6mm</b>	<b>7mm</b>	<b>8mm</b>	<b>9mm</b>	<b>10mm</b>	<b>11mm</b>	<b>12mm</b>
<b>Cs-137 Reduction</b>	<b>27%</b>	<b>32%</b>	<b>34%</b>	<b>42%</b>	<b>50%</b>	<b>56%</b>	<b>62%</b>	<b>66%</b>	<b>70%</b>	<b>73%</b>



## StemRad 360 Gamma Garment Inspection & Test Log

SERIAL #.....

DATE	INSPECTOR	REMARKS	TEST RESULTS

## Optional Accessories

**Real-time Radiation Monitor (NukAlert™)** The StemRad 360 Gamma optionally comes with a Nukalert real-time radiation monitor and specialized pouch. The Nukalert is a calibrated radiation meter that alarms when exposed to dangerous levels of nuclear radiation. It does not respond to relatively safe, low level radiation. Its primary utility is to aid in the location and evaluation of shelter during a radiation emergency. It may also be used to verify the reduction of radiation during evacuation. The NukAlert indicates radiation exposure by producing groups of audible alarm chirps about twice per minute. The number of chirps per group is easily counted. The approximate radiation intensity is indicated by the number of chirps produced per group. The lowest indicated level of radiation (0.1 Roentgen per hour) will cause a single chirp every 35 seconds. With each doubling of the radiation intensity, an additional chirp is added to each alarm chirp group. At 0.2R/hr the unit will double chirp every 30 seconds. At 0.4R/hr it will chirp three times in a row, repeating every 25 seconds, etc. At the highest level (above 50R/hr) the alarm will change to an uninterrupted series of siren-like sounds that become shorter and more frequent if the exposure rate continues to increase.

**Dosimeter Card (RADTriage)** The StemRad 360 Gamma optionally comes with a RADTriage dosimeter card for monitoring cumulative dose. The specialized placement of this card on the shielded side of the 360 and adjacent to the posterior marrow allows for monitoring the shielded marrow dose and may be used in determining the need for transplantation following exposure by a certified hematologist. RADTriage monitors 20 mSv (2 rad) and higher doses of Gamma/x-ray radiation in a radiological incident. The sensor instantly develops color upon exposure to radiation. Color development is permanent and cumulative. The longer the exposure the darker the color. How to read: Radiation will darken the sensor located between the numbered squares. Estimate the exposure dose by comparing the color of the sensor with the color reference squares. If the sensor develops a color in-between any two adjacent squares, this indicates an in-between dose. Check the FIT indicator regularly. The FIT indicator is located to the right of the sensor - the larger square with dark colored dots in the middle. If the dots have turned red the sensor has been exposed to excessive heat and the card must be replaced. The card is expired if the color of the area surrounding the dots of the FIT indicator matches the bar to its right. This can be caused by exposure to too much sunlight and/or heat, and means the card must be replaced.

**Page Intentionally Left Blank for User Notes**

[illegible]